



Ashesi University

Effect of Exchange Rate Volatility on Stock Prices In Ghana

By

Ransford Kwesi Asare-Kyere

Undergraduate dissertation submitted to the Department of Business Administration,
Ashesi University College. Submitted in partial fulfillment of the requirements for the
award of Bachelor of Science Degree in Business Administration

Supervised by: Anthony Essel-Anderson

April 2019

I hereby declare that this Thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:

Candidate's Name: **Ransford Kwesi Asare-Kyere**

Date: **April 2019**

I hereby declare that the preparation and presentation of the Thesis were supervised in accordance with the guidelines on supervision of thesis laid down by Ashesi

University.

Supervisor's Signature:

Supervisor's Name: **Anthony Essel-Anderson**

Date: **April 2019**

Table of Contents

DECLARATION.....	III
Keywords: effects,	7
CHAPTER ONE: INTRODUCTION	8
1.1 Background.....	8
1.2 Research Problem	10
1.3 Research Objective	11
1.4 Research Hypothesis.....	11
1.5 Significance of the Study	12
1.5 Methodology.....	13
CHAPTER 2: LITERATURE REVIEW	14
2.1 Introduction.....	14
2.2 Review of Theoretical Literature	14
2.2.1 Flow-Oriented Model.....	15
2.2.2 Stock-Oriented Model.....	15
2.3 Review of Empirical Evidence	16
2.3.1 Empirical Evidence on the Relationship Between ‘Exchange Rate and.....	16
Stock Price Movement’ for Emerging Economies	16
2.3.2 Empirical Evidence on the Relationship Between ‘Exchange Rate and.....	17
Stock Price Movement’ for Ghana.....	17
2.3.3. Conclusions on Empirical Review.....	19
CHAPTER 3: METHODOLOGY	20
3.1 Introduction.....	20
3.2 Research Design.....	20
3.3 Hypothesis	20
3.4 Data.....	21
3.5 Population	22
3.6 Sample	22
3.7 Model Specification.....	23

EFFECTS OF EXCHANGE RATE CHANGES ON STOCK PRICES	4
3.8. Test for Stationarity	23
CHAPTER FOUR: FINDINGS AND ANALYSIS.....	25
4.1 Introduction.....	25
4.3 Estimation Techniques.....	26
4.3.1 Augmented Dickey-Fuller (Adf) Test.....	26
4.4 Testing Of Hypothesis	28
4.4.1. Granger Causality Test	29
4.5. Limitations of Study	30
CHAPTER FIVE: SUMMARY AND CONCLUSIONS	31
5.1 Summary of Findings.....	31
5.2 Conclusions.....	32
5.3 Recommendations.....	32
5.3.1 Investors.....	32
5.3.2 Government	33
5.3.3 Further research	33
APPENDICES	35

Acknowledgement

My greatest thanks goes to the Almighty God for the grace to successfully complete this research. I deeply appreciate the contribution of my supervisor, Mr. Anthony Essel-Anderson, who provided extensive guidance and quality support during the period of the research. I would also like to extend my appreciation to everyone who in one way or another supported my research journey.

List of Tables

TABLE 1 SUMMARY OF STATISTICS OF VARIABLES.....	31
---	----

Abstract

The purpose of this study is to identify the whether there exists a Granger-causing relationship between exchange rate and stock prices. Using the Granger-Causality model as a framework, we employed daily data observations of the Ghana Stock Exchange Composite Index (GSE-CI) and the USD-Cedi exchange rate values across the period 2010 -2018.

The data used in the study were obtained from the Bank of Ghana and the Ghana Stock Exchange. Following a Granger-causality test on for causality from exchange rate to stock price change, as well as stock price changes, the results showed that there was neither variable significantly influenced the other. Thus, we concluded that exchange rate changes do not Granger-cause stock price changes or vice-versa. Despite these observations, investors should be aware of other effects of exchange rate in their investment decisions on the stock market.

Keywords: effects, exchange rate, stock price movement

CHAPTER ONE: INTRODUCTION

1.1 Background

The influence of exchange rate volatility on economic life has been a topical economic issue in numerous countries that have adopted the flexible exchange rate regime. Gatsi, Appiah, & Wesseh (2016) observe that the adoption of liberalized foreign exchange rate regimes by emerging economies in Asia and Africa has increased the traffic of funds and additionally unleashed its attendant effects on foreign exchange rates. It is widely believed that these effects span various aspects of economic life. In many countries, the stock market remains a critical component of economic life.

Generally, macroeconomic factors including exchange rate, inflation, and interest rate pose systematic risk to investors in a country. Systematic risk refers to the risk that is inherent in an economy and characterizes the market as a whole; hence, it is not peculiar to any one firm. Unlike unsystematic risk, which emanates from firm-specific factors and can be eliminated or reduced through diversification, systematic risk factors always prevail. As such systematic risk factors such as exchange rate must be considered by investors such stock market investors before making investment decisions.

The Ghana Stock Exchange (GSE) serves as the sole platform for stock market activity in Ghana. With about forty-three (43) listed stocks and an average total market capitalization of GHS 65 billion (GSE, 2018) across two listing categories, namely the Official list and the Ghana Alternative Market (GAX), the GSE serves as a reliable source of equity finance for both larger firms and relatively smaller firms operating in Ghana.

As observed by Winful, Sarpong & Kumi (2012), both investors and researchers are getting increasingly interested in the dynamics of stock market returns in emerging economies. This is due to the fast pace of development of the stock markets of emerging economies. Consequently, Ghana's status as an emerging economy positions studies related to stock prices as critical for policymakers and investors in better understanding the effects that critical risk factors exchange rate may have on it. Ghana's exposure to the flexible exchange rate regime began in 1983 as part of the Structural Reforms Program initiated under the surveillance of the International Monetary Fund and the World Bank. These reforms included interest rate reforms, removal of credit controls, as well as the adoption of the floating exchange rate regime. Ghana currently practices the managed flexible exchange rate program, where there is some level of intervention by monetary authorities besides market factors of demand and supply determining exchange rates. The floating exchange rate regime enabled free currency trade in Ghana but has had some detrimental consequences on the value of the cedi compared to its main currency trading partners, the US Dollar, Euro, and the Great Britain Pound.

Statistics from the Bank of Ghana show that the cedi has experienced substantial exchange rate depreciation and volatility since the adoption of the flexible exchange rate system. From 2007 to 2018, the cedi has lost over 300% of its value to its major partner trading currency (the dollar), depreciating from the equivalent of a dollar to a cedi, to a dollar to over 4 cedis.

1.2 Research Problem

The assessment of the influence of exchange rate volatility on an economy's financial position is one that has provided divergent views, primarily due to differences in research conclusions. Ghana adopted a floating exchange rate regime in 1983, an event that positions the subject of exchange rate volatility as pertinent to its financial sector, notably the stock market. Over the past decade, the country has experienced considerable exchange rate volatility. Consequently, exchange rate volatility has assumed topical eminence in contemporary economic and political debates, albeit not directly related to the stock market. It is imperative; however, we investigate the relationship between exchange rate and stock prices since the GSE serves as a reliable investment alternative for investors in the country.

The study would seek to assess the impact of exchange rate volatility on the Ghana Stock Exchange to equip investors with the requisite knowledge of the effects, if any, of exchange rate volatility on the stock market in Ghana. Some research conducted on the relationship between the exchange rate and stock prices for Ghana reached no consensus. Researchers such as Adjasi, Harvey, & Agyapong (2008) found that there was an inverse relationship between exchange rate volatility and stock market volatility. Using the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model, they found that “depreciation in the local currency leads to an increase in stock market returns in the long run (Adjasi et al., 2008). However, studies by Gatsi, Appiah, & Wesseh (2016) found no causality between exchange rate and stock price fluctuations. These different empirical results concur with Mishra's (2016)

observation that there had been no theoretical consensus on the relationship between exchange rate and stock market volatility.

This study would thus attempt to reconcile the different empirical research conclusions using recent data from 2010-2018 and leverage the gaps of the reviews above, therefore add to the literature on this topical issue of great socio-economic interest.

1.3 Research Objective

The objective of the research is to determine whether exchange rate volatility influences stock price movement in Ghana.

1.4 Research Hypothesis

The hypothesis tested in the paper draws from the Flow-Oriented Model propounded by Dornbusch and Fischer in 1980. The Flow-Oriented Model is a theoretical model that explains the relationship between exchange rate changes and stock price changes. This model suggest that exchange rate changes cause stock price changes. The model explains causality from a uni-directional perspective where exchange rate movement results in stock price movement. Drawing from a macroeconomic viewpoint, the Flow-Oriented

Model supposes that factors that lead to a decrease in cash flows of the firm, all things being equal, lead to a decrease in the stock price of the firm, or vice-versa. The model assumes that the stock price is equal to the value of the discounted cash flows of a firm. Consequently, stock prices mirror changes in the cash flow of a firm (Richards, Simpson, & Evans, 2007). Given this perspective, the depreciation of a local currency would be beneficial for firms whose revenues accrue mainly from exports, since the value of their exports would be cheaper. Conversely, the appreciation of a country's local currency makes imports cheaper for import firms, resulting in increased cash flows and revenues, and consequently stock price changes.

Following the framework above, the following hypothesis shall be tested:

H₀: Exchange rate volatility does not affect stock price movement in Ghana

H₁: Exchange rate volatility affects stock price movement in Ghana

1.5 Significance of the Study

The findings of the study would be especially relevant to investors, government, and other institutions in identifying the influence of exchange rate fluctuation on the stock market performance, especially given the unstable exchange rate situation in Ghana over the past decade, and particularly in recent years.

In addition, there have been few studies on the relationship between exchange rate changes and stock price movement in Ghana. This study, therefore, adds to the breadth of the studies conducted from a Ghanaian perspective on this topical issue. Furthermore, this

study used data from the period after the redenomination of the Ghana cedi, specifically from 2010 to 2018, in the development of a current perspective on the subject.

1.5 Methodology

The study deployed a quantitative approach to assess whether there was a relationship between exchange rate volatility and stock price changes in Ghana. The study used data from the Ghana Stock Exchange and the Bank of Ghana respectively over the period 2010-2018. The dataset for the research included cedi-dollar exchange rate data and the Ghana Stock Exchange Composite Index (GSE-CI) price data.

The study adopted an explanatory research design since the study assessed whether exchange rate volatility affects stock price movement. The dependent variable for the study was the Ghana Stock Exchange Composite Index (GSE-CI), and USD-CEDI exchange rate prices constituted the independent variables for the study.

The data was analyzed using a simple linear regression model as well as the Granger-Causality Model to assess the existence and extent of a relationship between exchange rate and stock price volatility.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section explores the extensive theoretical and empirical literature on the relationship between exchange rate and stock prices worldwide. The first section discusses the theoretical underpinnings of the study. It discusses how the two main theoretical models, the Flow-Oriented model, and the Stock-Oriented model explain the relationship between exchange rate and stock prices. The second section reports on the empirical approaches and results to the question of the influence of the exchange rate on stock prices across the world. It contains three reviews including a review of the literature on developed economies, a review of the literature on emerging economies, and a review of the literature on Ghana.

2.2 Review of Theoretical Literature

The Flow-Oriented Model and the Stock-Oriented Model constitute the two major theoretical stock models that explain the dynamic relationship between exchange rate changes and stock prices changes. This section explains the origins and claims of these models, ultimately providing a theoretical overview on the relationship between exchange rate volatility and stock prices movement.

2.2.1 Flow-Oriented Model

The Flow-Oriented Model, propounded by Dornbusch and Fischer (1980) posits that exchange rate changes lead to stock price changes. This model explains causality from a uni-directional perspective where exchange rate movement results in stock price movement. Drawing from a macroeconomic viewpoint, the Flow-Oriented Model supposes that factors that lead to a decrease in cash flows of the firm, all things being equal, lead to a decrease in the stock price of the firm, or vice-versa. The Flow-Oriented model assumes that the stock price represents the discounted cash flows of a firm. Consequently, stock prices mirror changes in the cash flow of a firm (Richards, Simpson, & Evans, 2007). Given this perspective, the depreciation of a local currency would be beneficial for firms whose revenues accrue mainly from exports, since the value of their exports would be cheaper. Conversely, the appreciation of a country's local currency makes imports cheaper for import firms, resulting in increased cash flows and revenues, and consequently stock price changes.

2.2.2 Stock-Oriented Model

In contrast, the Stock-Oriented model developed by Frankson (1983) and Branson (1993) postulates that stock price changes result in exchange rate changes. Thus, changes in prices of domestic stocks cause an increase or a decrease in demand and supply for these stocks. For example, a decrease in prices of domestic stocks would reduce investor appetite for these stocks, causing investors to sell off the underperforming stocks in favor of purchasing foreign stocks.

2.3 Review of Empirical Evidence

From a theoretical literature viewpoint, as evident in the flow-oriented models and the stock-oriented models, there is a relationship between exchange rate and stock prices, though the direction of causality differs. However, on the empirical front, extensive studies conducted on the relationship between exchange rate and stock prices have produced mixed results. Some studies found a relationship whereas others found no causal relationship between the two. A vast majority of related empirical research has been conducted on the stock markets and economies of developed countries, with relatively little work done on emerging economies. This section reports on the empirical evidence in developed countries, emerging markets, and Ghana.

2.3.1 Empirical Evidence on the Relationship Between ‘Exchange Rate and Stock Price Movement’ for Emerging Economies

Studies conducted on emerging economies and financial markets about the relationship between exchange rate and stock price movement have provided mixed results. Abdalla & Murinde (1997) studied the interaction between exchange rate and stock prices in the emerging financial markets of India, Korea, Pakistan, and the Philippines. Using monthly observations on the IFC stock price index, they found unidirectional causality between exchange rate and stock prices for three countries: India, Korea, and Pakistan. However, the study found different results for the Philippines. Like French et al. (1987) and Schwert (1989), they deployed monthly stock data in their analysis.

Adjasi and Biekpe (2005) also studied the relationship between exchange rate volatility and stock price returns in seven African countries and found that there was a long-run relationship between exchange rate and stock prices. However, in the short run, there was no causal relationship between the two variables.

2.3.2 Empirical Evidence on the Relationship Between 'Exchange Rate and Stock Price Movement' for Ghana

Empirical studies on the relationship between exchange rate and stock price movement in Ghana have produced similarly mixed results. Adjasi, Agyapong & Harvey (2008) studied the relationship between the exchange rate and the Ghana Stock Exchange and found a different relationship when viewed from a long and short run period. The researchers deployed the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) Model in their analysis. Using data from 1995 to 2005, they found an inverse relationship between exchange rate volatility and stock market returns. They observed that relationship differs based on the long run or short run viewpoint. In the long run, a depreciation in local currency would lead to an increase in stock returns whereas, in the short run, a depreciation in the local currency reduces stock market returns (Adjasi et al., 2008).

Adam and Tweneboah (2008) also investigated multiple macroeconomic factors that affected stock price movement in Ghana and found that exchange rate had a significant influence on stock price movement in Ghana. Using the Arbitrage Pricing

Theory (APT) framework to analyze Ghana Stock Exchange All-Share Index (GSE-ASI) data from 2006 to 2014, he concluded that exchange rate has a significant influence on stock price movement in Ghana.

However, Adu (2012) who also investigated the relationship between exchange rate and stock price movement using the Arbitrage Pricing Theory found results inconsistent with Adam and Tweneboah (2008). Adu (2012) found that exchange rate changes do not have a significant influence on stock price movement in Ghana. Studies by Gatsi, Appiah & Wesseh (2016) also supports Adu (2012). Gatsi et al. (2016) investigated the cointegration and the Granger Causality relationship between exchange rate and stock prices in Ghana. Following an Eagle-Granger two-step cointegration test, they found there was no cointegration between exchange rate and the stock market in Ghana. They also detected a structural break in the relationship between the two variables after the July 2007 redenomination of the Ghana Cedi. Specifically, Gatsi et al. found that there was unidirectional causality between exchange rate and stock prices before the redenomination of the Ghana Cedi, and no causality after the redenomination. Unlike the work of previous researchers, Gatsi et al. used daily stock price data compared to monthly data and quarterly data approaches used by some researchers, since daily data observations are more likely to capture Granger-causality and capital movements (Granger et al., as cited in Gatsi et al., 2016). The use of daily data may have accounted for the difference in observations identified among the researchers.

2.3.3. Conclusions on Empirical Review

Different conclusions have been reached on the relationship between exchange rate and stock price movement. The studies above deployed various methods as well as both simple linear regression and multiple linear regression models in the development of their research conclusions. Additionally, different time observations of data were deployed in the analysis of the study. These factors could account for the different conclusions as to the significance of exchange rate changes in explaining stock price changes.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The objective of the study is to assess whether exchange rate influences stock price volatility in Ghana. This chapter contains the research design, data collection method, and data analysis models and tools that study would deploy in fulfilling this objective.

3.2 Research Design

The study employs an explanatory research design. An explanatory research design is a research design that intends to explain rather than describe a phenomenon or a relationship. The dependent variable is the Ghana Stock Exchange Composite Index (GSE-CI), and the independent variable is USD-CEDI exchange rate.

3.3 Hypothesis

The Flow-Oriented Model by Dornbusch and Fischer (1980) is a theoretical model that suggests the existence of a relationship between exchange rate and stock prices. The model suggests that exchange rates change cause movement in stock prices. The Flow-Oriented model draws on the premise that stock prices are a reflection of the cash flows of the firm. Thus, a firm's stock price is equivalent to the discounted cash flows of the firm. Therefore, changes to cash flows emanating from exchange rate changes would consequently affect the stock price of the firm.

This hypothesis of the paper derives from the exchange rate causality claims of the Flow-Oriented Model. Thus, from a unidirectional viewpoint, there is the existence of causality from exchange rate and stock prices. This perspective informs the following hypothesis that was tested in this study:

H_0 : Exchange rate volatility does not affect stock price movement in Ghana

H_1 : Exchange rate volatility affects stock price movement in Ghana

Given the significant exchange rate volatility and increased level of activity in the stock exchange over the past decade, this paper builds on a study by Gatsi et al. (2016), which examined the existence of exchange rate Granger-causing stock price movement on the Ghana Stock Exchange. Gatsi et al. deployed data spanning 1998- 2011 in their analysis. The present study examined the relationship between exchange rate and stock prices using current data points (2010-2018), given the significant changes in exchange rate fluctuations in Ghana over the period.

3.4 Data

The dataset for the study was obtained from secondary sources. The dataset includes stock price data (Ghana Stock Exchange Composite Index (GSE-CI)) and the cedi dollar-rate exchange rate over the period 2010-2018. The stock price data were obtained from the Ghana Stock Exchange website whereas the exchange rate data was obtained from the Bank of Ghana website. The sources mentioned above are the original data origination sources, thus are believed to be credible. The Ghana Stock Exchange website is the official website of the Ghana Stock Exchange and holds a data repository on related stock market trading data. The Bank of Ghana website, on the other hand, is the official website of the Central Bank of Ghana.

3.5 Population

The population for the study is all listed companies on the Ghana Stock Exchange. Specifically, the Ghana Stock Exchange Composite Index (GSE-CI) data was used for the study. The GSE-CI is an index of all firms listed on the Ghana Stock Exchange. The GSE-CI is preferred over the Ghana Stock Exchange Financial Stock Index (GSE-FSI) because the GSE-CI comprises all listed stocks on the exchange, whereas the GSE-FSI comprises only financial stocks. Currently, there are over forty-three (43) firms listed on the Ghana Stock Exchange, with 42 companies on the Official List, and one company on the more recently created Ghana Alternative Exchange (GAX).

3.6 Sample

The sample for the study comprises the Ghana Stock Exchange Composite Index (GSE-CI), which is the principal stock index on the Ghana Stock Exchange. The GSE-CI is an average weighted capitalization index of 42 listed stocks, and thus is suited for the study because it fully captures the market information of all stocks on the Ghana Stock Exchange. Daily observations of the GSE-CI and USD- Cedi Exchange rate for the period 2010-2018 were considered for the study. Compared to other studies, particularly in larger and developed countries, there are fewer firms in the GSE-CI index. However, this does not affect the accuracy of the study as there are

3.7 Model Specification

Various economic models have been employed in testing causality between exchange rate and stock prices. This study deployed the Granger Causality Model developed by Granger (1981) in determining whether there is a causal relationship between exchange rate and stock prices on the Ghana Stock Exchange. We chose the Granger causality model over the other methods because of its favorable response to both small and large sample sizes (Odhiambo, 2008).

This study assumes that the time series data is stationary. However, Engle and Granger (1987) indicate that a significant number of time series data is not stationary. Thus, we shall assess the stationarity of our time series data to avoid spurious results when used in a regression analysis.

The simple linear regression model for the study is as shown below

3.8. Test for Stationarity

Gujarati, as noted in Gatsi (2016) suggests that “a data generating process is considered stationary if it has time-invariant first and second moments, and the covariance of two periods is constant notwithstanding which periods are used and the distance between them.” Time series data can be tested for stationarity using methods such as the Augmented Dickey-Fuller test, Dickey-Fuller test, Phillip-Perron test and the Ng-Perron test. This study adopts the Augmented Dickey-Fuller test to test for stationarity of both the exchange rate and stock price variables.

If the variables are found not to be cointegrated, then the following standard VAR will be estimated, and the Granger causality test is consequently conducted:

$$\Delta \ln SI_t = \alpha_0 + \sum \alpha_{1i} \Delta \ln SI_{t-i} + \sum \alpha_{2i} \Delta \ln ER_{t-i} + u_t \quad (1)$$

$$\Delta \ln ER_t = \beta_0 + \sum \beta_{1i} \Delta \ln SI_{t-i} + \sum \beta_{2i} \Delta \ln ER_{t-i} + v_t \quad (2)$$

Where SI is the stock price, ER is the exchange rate of the Ghana cedi to the US dollar, u_t and v_t represent uncorrelated white noise terms, \ln represents the natural log, Δ represents the difference operator, and t represents the period.

If the lagged coefficient of vector α_2 in equation (1) is significant, but that of vector α_1 in equation (2) is not significant, then the results imply that there is unidirectional causality from the exchange.

However, if the lagged coefficient of vector α_1 in equation (2) is statistically significant but the lagged coefficient of vector α_2 in equation (1) is not significant then the results imply that there is unidirectional causality from exchange rate to stock price.

Moreover, if the lagged coefficient vectors of both equations (3 and 4) are statistically significant, then the results imply that there is a bidirectional causality from the stock returns and exchange rate returns. Finally, if both lagged coefficient vectors are statistically insignificant, then this means that there is no causality between these variables.

CHAPTER FOUR: FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the findings of the empirical tests conducted and their interpretations. This study employed daily data observations of stock price and USD-GHS exchange rate data for the period 2010 -2018. Unlike other studies, which deploy weekly, monthly, or yearly data observations, daily data observations were used for the study, as they are more likely to find Granger-causality (Granger et al., 2000). The sample period for the period is the post-redenomination period of the Ghana Cedi, which began in July 2007. However, the due to difficulties in accessing data beginning in 2007, the study covered the period 2010 to 2018.

4.2 Results of Descriptive Statistics

Descriptive analysis was conducted on the two variables namely $\Delta \ln SI$ (change in natural log of the GSE-CI prices) and $\Delta \ln ER$ (change in natural log of the Exchange rate). Daily data on the GSE-CI and Exchange rate collected for the period 2007 to 2018 was used to generate the return series for both stock index and the exchange rates. The return series was calculated as follows:

$$R_t = \ln(P_t/P_{t-1}) * 100.$$

Table 1

Summary of Statistics of the Return Series

Statistic	$\Delta \ln SI$	$\Delta \ln ER$
Mean	0.04725	0.05817
Median	0.01715	0.00000
Maximum	2.86200	10.07050
Minimum	-2.91440	-7.79210
Std Dev	0.5686667	0.9564941
Skewness		
Kurtosis		

Source: Author's estimates from R

4.3 Estimation Techniques

Studies have used various econometric approaches in determining causal relationships between multiple phenomena. This study adopted the Vector Autoregressive Model and the Granger Causality Model to determine the relationship between exchange rate returns and stock price changes.

As noted by Engle and Granger (1987), many empirical studies have refuted the assumption that studies premised on time series data are stationary. Hence, stationarity test was conducted to avoid spurious results resulting from the use of non-stationary time series data in regression analysis (Granger and Newbold, 1974).

4.3.1 Augmented Dickey-Fuller (Adf) Test

Augmented Dickey-Fuller Test version tests the null hypothesis that there is a unit root in a time series sample. The Augmented Dickey-Fuller (ADF) statistic, used in the test, is a negative number. The more negative the test statistic is, the stronger the rejection

of the hypothesis that there is a unit root at some level of confidence. The ADF model tests the null hypothesis that there is a unit root against the alternative hypothesis that there is no unit root in the regression. The regression for the ADF test is estimated as follows:

$$\Delta Y_{t-1} = \lambda + \varphi t + \eta Y_{t-1} + \varphi \Delta Y_{t-1} + \dots + \varphi \Delta Y_{t-p} + \varepsilon_t$$

Where Y_t represents the variable under examination,

Δ is the difference operator,

λ , η , and are the coefficients to be estimated,

p is the chosen lag length,

t is the time trend, and

ε_t is the white-noise error term.

Y_t has a stochastic trend under the null hypothesis but under the alternative hypothesis is stationary. Generally, the lag length for conducting the ADF test is unknown but can be estimated using information criteria such as the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) applied to the regressions of the form in equation (1). If the Data Generating Process (DGP) is stationary in the data series at levels, then it will be concluded to be integrated of order zero, $I(0)$. On the contrary, it is not always the case, and the underlying process of the data series may be non-stationary. In effect, the original series need to be transformed into a stationary state by taking difference (d) times. If after taking the first difference of the series, we find that they are all stationary, then we can conclude that the DGP is integrated at order one, $I(1)$. Moreover, if the original series used in the study are found out to be integrated of the same order, it is useful to test for cointegration relationship between the integrated variables.

4.3.2. Discussion of Results of Simple Linear Regression

The following are the results from the OLS regression.

Table 4

Residuals					
Min	1Q	Median	3Q	Max	
-2.94276	-0.23095	0.02926	0.21162	2.81404	
GSE-CI	Coef	Std. Err	t-stat	Pr(> t)	
Intercept	0.04827	0.01281	3.769	0.000169	***
$\Delta \ln(\text{ER})$	-0.01746	0.01337	-1.306	0.191731	
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
Residual standard error: 0.5686 on 1976 degrees of freedom					
Multiple R-squared: 0.0008623, Adjusted R-squared: 0.0003567					
F-statistic: 1.705 on 1 and 1976 DF, p-value: 0.1917					

4.4 Testing Of Hypothesis

The general rule of thumb in hypothesis testing is that the independent variable is significant at a 95% confidence level if

- Its t-statistic is above 2 or below -2
- Its p-value is less than 0.05

Thus, if the independent variable is found to be significant at the confidence level, we reject the null hypothesis and accept the alternative hypothesis. Inversely, if the independent variable is found to not be significant at the confidence level, the null hypothesis is accepted.

4.4.1. Granger Causality Test

We examine the direction of causality between the foreign exchange rates returns and the stock price returns by employing the Granger (1969) causality model. Granger causality test is preferred to other methods because of its favorable response to both small and large sample sizes (Odhiambo, 2008). We accept the null hypothesis that exchange rate returns do not Granger-cause stock price returns because the F-statistic is less than the critical values. The P-value (0.497) supports this conclusion as it is higher than the 0.05 confidence interval (see Table 2). We also accept the null hypothesis that stock price returns do not Granger-cause exchange rate returns because the F-statistic is less than the critical values. The P-value of 0.6404 supports this conclusion as it is larger than the 0.05 confidence interval (see Table 2).

Table 2

GRANGER CAUSALITY TEST

Null Hypothesis	F-statistic	P-value	Decision
$\Delta \ln(\text{ER})$ does not Granger cause $\Delta \ln(\text{SI})$	0.6994	0.497	Accept
$\Delta \ln(\text{SI})$ does not Granger cause $\Delta \ln(\text{ER})$	0.4458	0.6404	Accept

Source: Author's estimate from R Studio

4.5. Limitations of Study

A fundamental limitation in the data analysis was the difficulty in accessing data from the beginning of the post-redenomination of the cedi. Thus, the study used data observations beginning in 2010 instead of 2007. However, the use of daily data observations in the analysis, facilitated by the receptiveness of the Granger Causality Model to both large and small data points limited the effect of the absence of the said data point (2007 -2010).

CHAPTER FIVE: SUMMARY AND CONCLUSIONS

5.1 Summary of Findings

The study investigated the relationship between exchange rates and stock prices on the Ghana Stock Exchange. Following the Granger Causality test, we found that there was no relationship between exchange rate and stock prices. A similar causality test on the existence of a Granger-causing relationship between stock prices and exchange rate found no relationship. Thus, the findings of this study refute the Flow-Oriented Model Theory, which suggests that changes in the exchange rate causes stock price movement. Similarly, the findings of the study are inconsistent with the Stock-Oriented Model theory which supposes that stock price changes lead to exchange rate changes.

The results of the study are consistent with findings of Gatsi et al. (2016) who found that the presence of Granger-causing relationship between exchange rate and stock prices was not present in the post- cedi redenomination period. The results of bi-directional causal relationships both were both statistically insignificant at a significance level of 5%.

Thus, statistically, we, therefore, infer that the redenomination policy helped to stabilize the cedi comparatively and therefore the fluctuations in exchange rates could not immediately cause significant changes. A similar conclusion was reached for changes in stock prices causing exchange rate changes.

5.2 Conclusions

Previous studies on the relationship between exchange rate and stock prices have provided mixed results. The findings of this study is consistent with Adu (2012) and Gatsi et al (2016) who similarly found that exchange rate did not have significant explanatory power over stock price movement. This is especially true for the post cedi-redenomination period of Ghana. This observation, however, differs from some observations of exchange rate- stock price movement causality in other research studies Adam & Tweneboah, and Agyapong et al. who found the existence of inverse relationship between exchange rate and stock price.

5.3 Recommendations

In line with the conclusions of the study, the following recommendations are made in the areas of policymaking, and for investment decision making. Areas for further research are hereafter recommended.

5.3.1 Investors

Investors should not be too concerned about the exchange rate phenomenon when making investment decisions regarding stocks on the Ghana Stock Exchange. The exchange rate definitely has implications for individuals, businesses and the economy alike, but has little and insignificant explanatory power over changes observed on the Ghana Stock Exchange. However, investors should be aware of other systematic risk factors such as interest rate, inflation rate which have been proven in some studies to influence stock price movement.

5.3.2 Government

Government should take considerable measures to address the depreciation of the cedi. Despite not directly influencing stock price changes, the exchange rate influences returns (dividends) earned by investors. Depreciation of the local currency thus does not augur well for international investors who suffer trading losses resulting from conversion into international currencies such as the US Dollar.

5.3.3 Further research

Further research can be done in other areas of the stock market in Ghana. As a developing stock market in the sub-region, a plethora of research into stock market operations will provide the requisite knowledge required by investors and policy makers alike in making decisions.

BIBLIOGRAPHY

- Adam, A. M., Tweneboah, G. (2008) Macroeconomic Factors and Stock Market Movement: Evidence from Ghana. SSRN
- Adjasi, C. K.D., and B.N. Biekpe. (2005), Stock Market Returns and Exchange Rate Dynamics in Selected African Countries: A bivariate analysis, *The African Finance Journal*, July, Cape Town, South Africa.
- Adjasi, C., Harvey, S.K., Agyapong, D. (2008). Effect of exchange rate volatility on Ghana Stock Exchange. *African Journal of Accounting, Economics, Finance, and Banking Research Volume 3*. (Issue No. 3)
- Adu, D. A. (2012). *Effect of Macroeconomic Variables on Stock Market Returns Ghana: An Analysis Using Arbitrage Pricing Model*. Institute of Distance

Learning, Kwame Nkrumah University of Science and Technology, Kumasi.

Branson, W.H. (1983). Macroeconomic Determinants of Real Exchange Risk, in R.J. Herring (ed.), *Managing Foreign Exchange Risk*, Cambridge University Press, Cambridge, MA.

Dornbusch, R., S. Fischer (1980). Exchange Rates and the Current Account, *American Economic Review*, 70 (5), pp. 960-971.

Gatsi, J. G., Appiah, M. O., Wesseh, P. K. Jr. (2016). Exchange rates and Stock Prices in Ghana. *Journal of Applied Business and Economics*, Volume 18 (Issue 3).

Ghana Stock Exchange. (2018). *Structure and Function*. Retrieved from <https://gse.com.gh/about/Structure-and-Function>

Granger, C. W., Huangb, B. N., & Yang, C. W. (2000). A bivariate causality between stock prices and exchange rates: evidence from recent Asian flu. *The Quarterly Review of Economics and Finance*, 40(3), 337-354.

Frankel, J. (1983) A. Monetary and Portfolio-Balance Models of Exchange Rate Determination, in J.S. Bhandari & B.H. Putnam (eds.), *Economic Interdependence and Flexible exchange rates*, MIT Press, Cambridge, MA.

Mishra, K. A. (2004). Stock Market and Foreign Exchange market in India: Are they related? *South Asia Economic Journal*, 5:2, Sage Publications, New Delhi.

Richards, N., Simpson, J., & Evans, J. (2007). The interaction between exchange rates and stock prices: An Australian context. *International Journal of Economics and Finance*. Volume 1.

Winful, E. C., Jnr, D. S., & Kumi, P. K. (2012). The performance of the Ghana stock exchange for the period 2000 to 2009. *African Journal of Business Management*, 6(38), 10340- 10359.

APPENDICES





